RESOURCE AND PATIENT MANAGEMENT SYSTEM

IMMUNIZATION MODULE

TECHNICAL MANUAL

Version 7.1
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Albuquerque, New Mexico

PREFACE

This is the Technical Manual for the RPMS Immunization software module. Its purpose is to provide additional useful information to computer personnel regarding function and operation of the Immunization software. The Technical Manual is intended for use by knowledgeable computer personnel and not the typical end user.

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1.0   INTRODUCTION

The original RPMS Immunization tracking software was written in the 1980s. Version 7.0, which was a complete rewrite of the Immunization software, began in 1996 with consultation from a national team of IHS field staff who developed a set of design requirements for the software. The current Version 7.1 software replaces v7.0 and v6.8.

1.1   OLD FEATURES OF VERSION 6.8
Version 7.0 contains many of the features that were found in the old version 6.8 of the Immunization software. These features include the ability to track patients' immunization due dates, enter and edit patients' immunization histories, print due lists and letters, print a Quarterly Immunization Report of Age-appropriate Immunizations, and print a Vaccine Accountability (Doses Administered) report.

1.2   NEW FEATURES OF VERSION 7.0
Version 7.0 contains many new or updated features. Immunization due dates are forecast by a regularly updated forecasting algorithm, ImmServe, developed and maintained by Medical Decision Associates. ImmServe also provides a detailed report or "profile" on each patient's immunization history and forecast. An unlimited number of Letters may be created and customized. Immunization data may be exported for transmission to a State Immunization Database or a software program such as CASA, which calculates immunization rates. In addition to the Quarterly Immunization Report, the Two-Year-Old Report presents vaccine-specific and vaccine-combination reports of immunizations for two-year olds to chart progress toward Year 2000 Health Objectives.

1.3   NEW FEATURES OF VERSION 7.1

Version 7.1 contains the following enhancements and updates to v7.0:

1) **Polio:** All references to OPV have been removed. Only IPV is forecast.
2) **Rotavirus:** Rotavirus vaccine and forecasting is automatically inactivated.
3) **Influenza:** Influenza vaccine will be routinely forecast for persons ≥50 years old.
4) **Patient View Screen:** On the Patient View screen, in the Forecast section on the right hand side, the dates have been removed from the display of "due" and "past due" because they caused confusion. Only the vaccines due on the date of the forecast will be displayed.
5) **Forecasting options:** There are now 9 forecasting Rule Sets. To select a Rule Set: choose "MGR" (Manager Menu), choose "Edit Site Parameters", choose "Forecasting Rules", review the Rule Sets and select one that matches your immunization schedule. The forecasting Rule Sets are:

> 1. 12m IPV Pn Var, 15m DTaP, Hib, MMR
> 2. 12m IPV Hib MMR Pn Var, 15m DTaP
> 3. 6m IPV 12m DTaP Hib MMR Pn Var

    4. 12m DTaP Hib IPV MMR Var Pn
    5. Comvax 12m HepB MMR Var Pn 15m DTaP IPV
    6. Comvax 12m HepB DTaP Pn MMR Var IPV
    7. Comvax 12m HepB IPV MMR Pn 15m DTaP Var
    8. Comvax 6m IPV 12m HepB MMR Var 15m DTaP Pn
    9. Comvax 12m HepB MMR Pn 15m DTaP IPV Var

    * Please note: The Immunization package does not list "Comvax" as a separate vaccine. Comvax should be entered as PedvaxHIB and Hep B vaccines, using the same Lot# to link the two vaccines.

6) Measles dose numbers: We have added a dose number to Measles to eliminate errors resulting from not having a dose number. Dose numbers are currently required for all vaccines except Influenza and Pneumovax.

7) Pneumococcal Conjugate Vaccine: There are now 2 pneumococcal vaccines:

    a) Pneumo-PS- (Pneumovax) - forecast for adults > 65 (in AK forecast >55, every 6 years);
    b) Pneum-conj.- pneumococcal conjugate vaccine (PrevnarJ) - forecast for children 6 weeks to 59 months of age.
    c) Pneum-conj. is forecast at 2,4,6, and 12-15 months of age. For children starting late:

        ● 7-11 months of age - 2 doses, 4 weeks apart; booster after 8 weeks at 12-15 mos.

        ● 12-24 months of age - 2 doses at least 8 weeks apart.

        ● 24-59 months of age - 1 dose.

8) Printing: A problem that sometimes resulted in control character printing at the tops of letters has been fixed.

9) Reports: Pneumococcal conjugate vaccine has been added to the Quarterly Immunization Report (but pneum-conj doesn't count in the totals), the Two-Year-old report and the Vaccine Accountability Report.

10) Reports: A "Health Care Facilities" parameter has been added to the Quarterly Immunization and the Two-Yr-Old Immunization Reports. If you select for specific Health Care Facilities, only patients who have active chart #'s at one or more of the selected Facilities will be included in the report.

11) Letters: If the RPMS Scheduling Package is being used at a site, you can now choose to have the patient's next scheduled appointment to appear on a Due Letter. Next Appointment will also appear at the bottom of the Patient View Screen, and Next

Appointment is now an element that may be included in the Due List as Additional Information.

12) Export: Two new Data Elements have been added to the Export: "Mother's Maiden Name" and "Patient Beneficiary Type".

13) Data entry: If a patient is hospitalized and has not yet been discharged, the software was changing the Category of any new immunization entered from Ambulatory to Inpatient. This created a problem for sites that enter Contract hospitalizations but never "discharge" the patients. Now the Immunization software will ignore a hospitalization if it has a Visit Type of "Contract".

14) Patient Menu Change: Wording of options on the Patient Menu has been changed to more clearly indicate that the Lists and Letters option is not limited to "Due Lists" (lists of patients who are due for immunizations). Several other listings of patients are available under the option now named "Patient Lists and Letters."

15) Other minor bugs have been corrected.

2.0   TECHNICAL OVERVIEW

2.1   NAMESPACE CONVENTIONS

The namespace assigned to the RPMS Immunization package is **BI**.
The numberspace is 9002084-9002084.99.

2.2   KEY VARIABLES

BIADFN	IEN of V IMMUNIZATION just created.
BIBEGDT	Begin date of a date range
BICAT	Category: A (Ambul), I (Inpat), E (Event/Hist)
BICMGR	Case Manager
BIDATE	Date of Visit (FileMan format).
BIDFN	DFN of Patient in ^DPT and ^BIP
BIDOSE	Dose# number for this Immunization.
BIENDDT	End date of a date range
BIIEN	IEN of an entry
BILOC	Location of encounter (IEN).
BILOT	Lot number for this Immunization (text).
BINAME	Patient Name
BIOLOC	Other Location of encounter (text).
BIPAGE	Page count
BIPROV	Provider
BIPTR	Vaccine (IEN in IMMUNIZATION File).
BIREC	Vaccine Reaction (text).
BISSN	Social Security Number
BITITLE	Text of Title
BITYPE	Type of Visit (PCC Master Control File I,C,6).
BIVHL7	Vaccine HL7 Code.
BIVNAM	Vaccine Name, short form.
BIVSIT	IEN of Visit.

NOTE: The above are only a few of the more commonly used variables in the package. No BI-namespaced variable can be assumed to be present in the local symbol table at all times. Many variables in the code are referenced extrinsically, calling code in the routines BIUTL1 through BIUTL8.

2.3   RESOURCE REQUIREMENTS

The size of the table files that come with the package are insignificant. Data storage for the package is roughly 100 megabytes for a database of 25,000 patients with 1,000,000 immunizations.

2.4   EXTERNAL/INTERNAL RELATIONS

Minimums of FileMan V. 21, Kernel V. 8, and PCC Health Summary V. 2.0, patch 3 are required to run this package. It is also critically important that the screen handling codes for C-VT100 be up to date in the Terminal Type File.

This V. 7.1 makes use of a piece of commercial software called ImmServe, distributed by Medical Decisions Associates, Inc (MDA). This software is an immunization forecasting utility. Immunization "forecasting" is the complex and ever changing process of determining which immunizations patients are due for, based on their immunization history.

The IHS and MDA have worked closely to produce immunization forecasting for RPMS which utilizes the latest HL7/CVX codes for vaccines and vaccine combinations, as maintained now by the Centers for Disease Control (CDC). Renewal of the annual IHS-wide license with MDA for this software will allow the RPMS Immunization Package to remain abreast of the latest vaccines and vaccine combinations licensed by the Food and Drug Administration (FDA).

ImmServe is basically a C program that runs on the same host file server that MSM runs on. The C program is loaded into memory by MSM's XCALL utility and resides in memory as long as MSM is running, which provides efficient processing of forecasts even when tens of thousands of patients are being processed for reports. (See the Installation Notes in this manual for information on installing ImmServe.)

2.5   SACC EXEMPTIONS/NON-STANDARD CODE

The BIXCALL routines open, use, and close the Host File Server directly and temporarily resets the Error Trap during the XCALL to ImmServe, the c-program commercial forecasting software. This is done to avoid losing IO variables and unintentionally closing printer devices will calling the HFS to produce Imm forecasts by ImmServe. All code is ANSI M Standard.

3.0 PACKAGE SECURITY

3.1 SECURITY KEYS

There are three Keys included in the Immunization, V. 7.1, Package:

BIZMENU   Security Key to the Main Menu of Immunization.
BIZ EDIT PATIENTS Security Key to allow enter/edit of Patient Data.
BIZ MANAGER   Security Key to Manager Menu.

BIZMENU

Gives Users access to the Main Menu of the Immunization Package V. 7.1, with minimal permission to view Patients' Immunization data, to print Official Immunization Records, to view/print Due Lists, and to run reports.

BIZ EDIT PATIENTS

Gives Users the ability to ADD/EDIT Patients' immunization data, contraindications, skin tests, and other patient information. This Key functions by making various Add/Edit Actions available on the main Patient View screen of the Patient Immunization Record Option.

(Users without this key will still be able to view patient data from the Patient Immunization Record Option, but they will only be able to view the Immunization data and the Health Summary, and print the Official Immunization Record.)

BIZ MANAGER

Gives Users access to the Manager Menu of the New Immunization Package and the full range of Manager functions, such as, editing Case Managers, editing Form Letters, editing Site Parameters, etc.

3.2 LEGAL REQUIREMENTS

There are no legal requirements connected with the RPMS Immunization package.

3.3 FILEMAN ACCESS CODES

All users of the RPMS Immunization software should have a "M" as part of their FileMan Access Code.

4.0   ROUTINES

4.1   ROUTINES TO MAP

For those sites where routine mapping is applicable, all BI* routines should be mapped.

5.0   FILE & GLOBAL LIST

FILE NUMBER	FILE NAME	GLOBAL
9002084	BI PATIENT	^BIP(
9002084.01	BI CASE MANAGER	^BIMGR(
9002084.02	BI SITE PARAMETER	^BISITE(
9002084.1	BI PATIENT IMMUNIZATIONS DUE	^BIPDUE(
9002084.11	BI PATIENT CONTRAINDICATIONS	^BIPC(
9002084.12	BI PATIENT FORECAST ERRORS	^BIPERR(
9002084.33	BI TABLE ERROR CODE	^BIERR(
9002084.35	BI PROBLEM PATIENTS	^BIPP(
9002084.4	BI LETTER	^BILET(
9002084.45	BI LETTER SAMPLE	^BILETS(
9002084.61	BI USER SELECTIONS	^BISELECT(
9002084.62	BI USER DATE-LOC LINE	^BIDLOC(
9002084.63	BI USER AGE RANGE	^BIAGRG(
9002084.7	BI PACKAGE INFORMATION	^BINFO(
9002084.8	BI TABLE REACTION	^BIREC(
9002084.81	BI TABLE CONTRA REASON	^BICONT(
9002084.91	BI TABLE DATA ELEMENT	^BIEXPDD(
9002084.93	BI TABLE VACCINE GROUP (SERIES TYPE)	^BISERT(
9002084.94	BI IMMUNIZATION TABLE HL7/CVX STANDARD	^BITN(
9002084.95	BI IMMUNIZATION TABLE OLD LOCAL	^BITO(
9002084.96	BI IMMUNIZATION TABLE TRANSLATION	^BITT(

6.0 APPENDIX A: VERSION 7.1 PACKAGE SETUP INFORMATION

This appendix contains printscreen of the entire text of the Package Setup Information that is presented under the PKG – Package Setup Information option of the Manager Menu (MGR→ PKG).

The text presented here is intended to provide Site Managers with helpful information regarding setup and management of the RPMS Immunization Package, version 7.1.

6.1 OPTIONS

The main menu option for the Immunization package is BIMENU. At most sites this would be placed on AKMOCORE along with other RPMS packages. For the sake of consistency from site to site, it is recommended that the synonym "IMM" (Immunization) be given to the main menu option BIMENU, however, this is not a requirement. BIMENU allows access to every other option within the package. (The Package Keys, BIZMENU ,BIZ EDIT PATIENTS, and BIZ MANAGER, are discussed below under Security in Section II.)

The option BI PATIENT VIEW/EDIT, "Patient Immunization Record", is the main option for all users to view a patient's immunization data. This option allows users to display or print the patient's Immunization History and Forecast, Official Immunization Record, and Health Summary. If the user has the appropriate key (BIZ EDIT PATIENTS), additional actions for adding/editing patient data will be made available under this option.

NOTE: Users accessing this option will have NO ADD/EDIT capability whatsoever--it will be informational only--UNLESS they have the BIZ EDIT PATIENTS Key; in which case additional Add/Edit Actions will be available. (See Security Section II below.)

This option may be attached to any other Kernel menu and need not be accessed via the main menu, BIMENU. This option is found within the package under the Patient Menu of the Immunization Main Menu.

After this package has been installed and the BIMENU and BI PATIENT VIEW/EDIT Options added to the appropriate menus, it is a good idea to run the "Build Primary Menu Trees" Option under Kernel Menu Management (under AKMOEVE). This will enable users to jump to menu synonyms within the new Immunization Package.

6.2 SECURITY

The Security Key BIZMENU allows users to access the Main Menu of the RPMS Immunization Package, BIMENU, and its submenus for viewing Patient data and Reports. The BIZMENU Key does NOT provide any Add or Edit capabilities, however, Holders of this key may print patient letters, view patient data, and run reports.

The Security Key BIZ EDIT PATIENTS allows users to ADD and EDIT a patient's Immunization History, Contraindications, Skin Tests, Parent/Guardian, etc. This key does not provide access to any additional menu options; instead, it adds several Actions to the main Patient View screen. This Key should be given to staff who are responsible for data entry and Patient Management.

The security key BIZ MANAGER allows a user to access the Manager Menu (BI MENU-MANAGER), which is a submenu of the main menu (BIMENU). The Manager Menu provides access to many sensitive functions pertaining to Site Parameters, Form Letters, the Vaccine Table, Lot Numbers, Exports, and the allocation of Security Keys.

The BIZ MANAGER Key should only be given to the manager of the Immunization Package.

Also see "Explanation of Keys" Action on the HOLDERS OF IMMUNIZATION KEYS" Screen (MGR-->KEY).

6.3 DEVICES

This package makes extensive use of the VA Screen Manager and List Manager, which requires that several of the cursor and screen handling fields of the Terminal Type file be present for any Device accessing the package. It is recommended that any Device accessing this package be given a Terminal Type ("Subtype") of "C-VT100", since the standard VA Kernel distribution comes with all of the necessary codes pre-loaded. A user whose Terminal Type does not contain a complete set of screen handling codes will receive a message that Screenman cannot "load the form."

If you suspect that the screen handling codes for C-VT100 on your system are not complete, this package comes with a routine, BIVT100, that will update (as of 1999) your VT100 codes. The routine must be run from Programmer Mode, and a line with ZIS must be uncommented. This job should be done by a programmer or experienced Site Manager.

Other Terminal Types may also be chosen, however, the screen handling codes for Cursor movements, "PF keys", "Erase Entire Page", etc., may need to be entered manually if they are not already present for the selected Terminal Type.

If for some reason it is not practical to define Devices accessing the package with a Subtype of C-VT100, users of the package may be given a "DEFAULT TERMINAL TYPE FOR LM" in the NEW PERSON File #200 of C-VT100. (They will then be given a Terminal Type of C-VT100 regardless of which DEVICE they sign on through.) It may also be necessary to set the field "ASK DEVICE TYPE AT SIGN-ON" (again in file #200) equal to "ASK" in order to get a user's Terminal Type to change to the C-VT100.

It is important that PC's accessing this software through terminal emulation software have their function keys F1-F4 set to transmit standard VT-100 codes for these keys rather than other customized codes.

This software makes use of basic character format codes such as Reverse Video, Highlight, and Underlining. It may be helpful to adjust the colors that the terminal emulation software employs to display these formats.

There are several network terminal emulation programs available, however many of them have limitations such as not recognizing function keys, not displaying reverse video, not slave printing, etc. As of this printing, April 1999, we have found that NetTerm 4.2.8, available at a nominal cost from Intersoft International, Inc. via the WWW, is among the best products for use with RPMS software. As of July 1999, trial versions may be obtained online at:

http://starbase.neosoft.com/~zkrr01/html/netterm.html

Initial difficulties with the screen handling codes for ScreenMan and Listman are not specific to Immunization; however, if problems with the setup cannot be resolved, please contact your Computer Support staff for further assistance.

6.4 OLD MCH IMMUNIZATION MENUS/OPTIONS

<u>WARNING!</u>

Execution of certain options in the old MCH Program may cause corruption of the Vaccine Table (IMMUNIZATION File #9999999.14) or result in program errors.

It is therefore important to remove any of the old MCH Program options from the Kernel menus. These old options appear as "AMCH..." and are most commonly found under the AMCHMENU and/or AMCHMAIN options.

This installation will automatically place all AMCH options in an "OUT OF ORDER" status.

As an additional precaution, it is advisable to first save and then delete all routines in the AMCH* namespace.

Any local modifications to the AMCH routines should be examined by your local programmer to determine what, if any, steps are needed to replace the previous local modifications/functions.

6.5   PARTITION SIZE AND STACK

Much of current RPMS software released in recent years requires at times a larger user partition or a large stack capability than earlier software did. This is due to increased sophistication and functionality of the software. A Site Manager need not understand these issues completely in order to recognize and correct problems relating to them. There are two specific issues that may arise in MSM; their solutions are presented here:

PARTITION SIZE - A Partition Size of 36k or even 50k may at times be
too small. This will be manifested by the occasional <PGMOV> error.
If this error occurs, raise the Default Partition Size to 100k.
This is done in the MGR UCI:

> D ^SYSGEN-->3(Edit Config)-->12(Default Part Size)-->100.

Be sure that any Tied Terminal entries are also set to 100k:

> D ^SYSGEN-->3-->8.

(See MSM Manuals for further instructions on SYSGEN.)

STACK - A Stack of 30k or less will at times be too small. This will be manifested by the occasional <STKOV> error. If this error occurs, raise the Stack Size to 50K or higher. This is done in the MGR UCI:

> D ^SYSGEN-->9(Sys Config Params)-->3(Stack and Stap)-->50.

 (See MSM Manuals for further instructions on SYSGEN.)

6.6   SITE PARAMETERS

As part of the installation of this new version of Immunization, the site parameters must be reviewed and edited.

The Site Parameter screen may be accessed from the programmer prompt by entering "D ^BISITE" (no quotes). It may also be accessed from within the Immunization menus by selecting Manager Menu from the the Main Menu, and then selecting Edit Site Parameters (MGR-->ESP). Help text is displayed during the edit each Site Parameter.

6.7   VACCINE TABLE

The Immunization Package version 7.1 comes with a new Vaccine Table (IMMUNIZATION File), which has been standardized with HL7/CVX Codes. There are several new fields in the Vaccine Table that relate to new functions in the package, most notably the ImmServe Forecasting utility (See IV. above). For this reason it is critically important that specific fields within the table not be altered.

Each time a user logs into the Immunization Package, the Vaccine Table is checked for integrity. If certain fields have been altered, a warning message is issued, and several functions within the package begin to display the warning. Some basic functions of the package will continue to operate, such as the display of a patient's immunization history. Other functions will only display the warning.

Listed below is the text of the warning. (Users without the BIZ MANAGER Key will not see the last paragraph.) As the warning indicates, restandardizing the table simply involves selecting "RES" from the Manager Menu. This can be done at any time, and users need not log out of the package. Runtime is a few seconds at most.

<u>WARNING</u>

Vaccine Table (IMMUNIZATION File) is not standard--cannot proceed.

At this point you should back out of the Immunization Package and contact your site manager or the person in charge of the Immunization Software.

Or, you may fix this by Restandardizing the Immunization File.

To do so, proceed to the Manager Menu and select Restandardize.

(Menu Synonyms: MGR-->RES)

6.8   DUPLICATE LOT NUMBERS

Some sites have duplicate Lot Numbers in their IMMUNIZATION LOT File, which will cause the storing of Immunizations in the V IMMUNIZATION File to fail. RPMS Immunization v7.1 recognized duplicate Lot Numbers ahead of time and informs the user. If the user holds the BIZ MANAGER Key, the text below will be displayed:

Two steps should be taken to resolve duplicate Lot Numbers:

STEP 1:
Duplicate Lot Numbers are resolved under the Manager Menu, "Lot Number Add/Edit" (MGR-->LOT). Go to this option and enter the Lot Number in question. Two or more

choices will be presented. Select one of the choices to be the valid Lot Number. Edit this Lot Number, making sure it is Active and that all relevant vaccines are listed under it.

STEP 2:
Select and edit each of the duplicate Lot Numbers.

Edit the Lot Number itself by placing "z" at the beginning (e.g., 483-116 --> z483-116). If there is a second duplicate, add "zz" to the beginning of that Lot Number; for a third duplicate, add "zzz", and so on. The adding of leading "z"s to the duplicates will make them distinguishable from the valid Lot Number. This method will also make the old duplicate Lot Numbers recognizable on pre-existing visits.

The duplicate Lot Numbers should also be made INACTIVE. If an old Visit is to be edited and it has one of the old duplicate Lot Numbers, the old duplicate should be replaced with the current valid Lot Number (easily recognized by ignoring the leading "z"s).

6.9   PROTOCOLS FOR USE BY OTHER PACKAGES

RPMS Immunization v7 contains 3 Listmanager Protocols that may be of use to programmers of other packages:

1) BI PATIENT VIEW/EDIT EXT CALL - This protocol calls up the Listman Patient View/Edit screen. The called assumes that DFN (patient) defined. Other optional parameters are described in routine HAVEPAT^BIPATVW. Users will only have Edit capability if they hold the BIZ EDIT PATIENTS Key.

2) BI IMMUNIZATION ADDED - This protocol is an Extended Action Type of Protocol (any protocols entered as ITEMS will be called when this protocol is called). The Description field of this protocol lists all of the defined variables that relate to the immunization that has just been added.

3) BI IMMUNIZATION DELETED - This protocol is an Extended Action Type of Protocol (any protocols entered as ITEMS will be called when this protocol is called). The Description field of this protocol lists all of the defined variables that relate to the immunization that has just been deleted.

*** END OF PACKAGE INFORMATION TEXT ***